

SECTION 16210

RACEWAY, FITTINGS AND BOXES

PART 1 - GENERAL

- 1.1 Provide raceways and fittings for all electrical and related systems where indicated, specified or required to form continuous raceways from the various service entrances to the various outlets.
- 1.2 Provide each outlet in the raceway system with an outlet box to suit the conditions encountered. Each box shall have sufficient volume to accommodate the number of conductors and conduits entering the box.
- 1.3 All wiring shall be in conduit. As an exception, metal-clad type MC cable shall be allowed for branch circuits #8 AWG and smaller, where allowed by the NEC.

PART 2 - PRODUCTS

2.1 RACEWAYS

- A. Conduit shall be hot-dipped, zinc coated or sherardized rigid steel (RS), intermediate metal conduit (IMC), electrical metallic tubing (EMT), or schedule 40 polyvinyl chloride (PVC).
- B. Flexible conduit shall be galvanized, continuous spiral, single strip type. Flexible conduit shall be covered with PVC jacket in wet or damp locations. Provide suitable fittings with ground connector.
- C. Surface metal raceway system shall be WIREMOLD 2000. It shall consist of an 0.040 inch thick formed steel assembly and an 0.025 inch thick steel, snapping cover plate. Finish shall be gray enamel inside and out over a corrosion-resistant metal treatment undercoat. Surface metal raceway shall be complete with end caps, coupling devices, wire clips, device plates, box connectors, wiring devices and accessories.

2.2 FITTINGS

- A. All conduit entering or leaving outlet, junction or pull boxes, and cabinets and all conduit stubs shall have bushings. Provide insulating bushings where required by NEC.
- B. Provide expansion fittings with bonding jumper where conduits cross expansion joints.
- C. Fittings for RS and IMC shall be threaded type.
- D. Fittings for EMT shall be threadless, approved for the conditions encountered and may be cast setscrew type or compression type.
- E. Fittings for PVC shall be PVC, primed and glued.
- F. Provide insulating wedge type cable supports in riser conduits in multi-story buildings.

2.3 SLEEVES

- A. All electrical system conduit shall have sleeves where conduit passes through concrete slabs except concrete slabs in contact with grade. All conduit 1 1/4 inch and larger running concealed above ceiling shall have sleeves where the conduit passes through masonry, tile and gypsum wall construction. All conduit running exposed below ceiling or in area without finished ceiling construction and passing through masonry concrete, tile and gypsum wall construction shall be provided with sleeves.
- B. Sleeves shall be constructed of galvanized steel pipe, Schedule 40.
- C. Provide escutcheon plates for all exposed conduit passing through walls, floors and ceilings. Plates shall be nickel plated, of the split ring type of size to match the pipe or conduit. Where plates are provided for conduits passing sleeves which extend above the floor surface, provide deep recessed plates to conceal the sleeves.

2.4 OUTLET BOXES AND JUNCTION BOXES

- A. Outlet boxes shall be pressed steel, electro-galvanized or cadmium plated with clean cut, easily removable knockouts. Except as noted hereinafter minimum size outlet box shall be 4" square, 1 1/2" deep, and shall be increased in dimensions to accommodate conductors, conduits, and devices as required by the NEC. Shallower boxes may be used where required by structural conditions and when specifically approved by the Architect/Engineer. Provide suitable plaster-rings to match wall construction and device. Ceiling and bracket outlet boxes shall not be less than 4" octagonal, 1 1/2" deep except that smaller boxes may be used where required by particular fixture to be installed.
- B. Floor boxes shall be manufactured by Walker, and shall be of the rectangular cast iron type, fully adjustable, and shall be provided with all necessary carpet rings and other fittings as required. All floor boxes shall be of the maximum depth possible for the locations indicated.
- C. Non metallic outlet boxes may be provided in PVC raceway systems.
- D. Outlet boxes in wet or damp locations shall be cast-metal, threaded hub-type with gaskets.
- E. Outlet boxes in masonry-block or tile walls shall be square-cornered masonry-type with tile type covers.
- F. Junction or pull boxes not over 100 cubic inches in volume shall be standard outlet boxes. Junction boxes over 100 cubic inches in volume shall be constructed of code gage, galvanized sheet steel. Junction boxes shall have removable covers and shall be accessible after completion of buildings.

2.5 CABINETS

- A. Cabinets shall be zinc-coated sheet steel, constructed with interior dimensions not less than those indicated on drawings, arranged for flush or surface mounting as indicated. Removable trim shall be provided with a hinged door and flush latch and lock. Locks shall be keyed same as panelboards.

2.6 ACCESS PANELS

- A. This Contractor shall furnish and General Contractor shall install access doors where required for electrical access, style as necessary for surface in which placed, sized as required, with cylinder lock. Interior doors shall be steel and exterior doors shall be aluminum. Access doors shall have same fire rating as ceiling, walls and/or partitions in which they are to be installed.

PART 3 - EXECUTION

3.1 RACEWAY AND FITTING INSTALLATION

- A. Conduits within building shall be GRS, IMC or EMT unless otherwise noted. Run conduits concealed within finished walls, ceilings and floors where possible, except where indicated on drawings to be run exposed. In addition, conduits may be run exposed in mechanical rooms and spaces with exposed construction when approved by the Engineer. Conduit shall be supported at intervals of not more than 8'. Run exposed conduit parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceiling. Conduit in areas with suspended ceilings shall be located when practicable between the structural system and the ceiling. All conduit to be run under the floor shall be run under the slab. Conduit shall not be run in the floor slab, except as required to feed floor boxes. Do not stack conduits beneath slab. Changes in direction of runs shall be made with symmetrical bends or cast metal fittings.
- B. Boxes for metallic raceways shall be cast-metal, hub-type when located in wet locations, when surface mounted on outside of exterior surfaces.
- C. Support conduits by pipe straps, wall brackets, strap hangers, or ceiling trapeze.
- D. Conduit run outside of building shall be buried a minimum of 24" below finished grade.
- E. Do not install EMT outdoors, or underground, or encased in concrete, or in hazardous areas, or in areas subject to severe physical damage.
- F. Do not install PVC in or through fire rated assemblies, in or through any walls, in or through any ceilings, in hazardous areas, in areas subject to severe physical damage, or exposed anywhere in the project.
- G. Conduit run underground, under slab, or within concrete encasement may be polyvinyl chloride (PVC) or RS or IMC conduit protected with 2 coats of bitumastic paint at the Contractor's option, unless another specific type of conduit is indicated. Convert PVC to RS or IMC before rising through floor slab or rising out of soil where conduit will be exposed. Where conduit is to be concealed within a wall, PVC may be stubbed up to the first outlet box or panelboard back-can. All conduit from that point on shall be metallic. Conduit run beneath slab shall be properly suspended from slab such that sub-slab settlement will not adversely affect electrical system.
- H. Service entrance conduits shall be concrete encased PVC or direct-buried RS.
- I. Flexible conduit shall be used to connect all motors, transformers and all equipment subject to vibration.

3.2 SLEEVE INSTALLATION

- A. Check floor and wall construction and finishes to determine proper length of sleeves for various locations. Make actual lengths to suit the following:
 - 1. Terminate sleeves flush with wall, partitions and ceilings.
 - 2. In areas where conduits are concealed, as in chases, terminate sleeves flush with floor.
 - 3. In finished areas, where conduits are exposed, extend sleeves 1/2 inch above finished floor, except in rooms having floor drains extend sleeves 1 inch above floor.
- B. Fasten sleeves securely in floors and walls, so that they will not become displaced when concrete is poured or when other construction is built around them. Take precautions to prevent concrete, plaster or other materials being forced into the spaces between conduit and sleeve during construction.
- C. Where sleeves pass through floors or fire rated walls provide proper sealant around conduit to maintain fire rating.

3.3 BOX INSTALLATION

- A. Support boxes for fixtures on suspended ceilings independently of ceiling supports. Fasten boxes and supports with wood screws on wood, with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screws or welded studs on steel. Nail-type nylon anchors may be used in lieu of wood screws, expansion shields, or machine screws. In open overhead spaces, cast boxes threaded to raceways need not be separately supported except where used for fixture support; support sheet metal boxes directly from building structure or by bar hangers. Where bar hangers are used, attach bar to raceways on opposite sides of box, and support raceway with approved-type fastener maximum 24 inches from box. When penetrating reinforced concrete members, avoid cutting reinforcing steel.

END OF RACEWAY, FITTINGS AND BOXES